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136. "Suppose a planked floor with thin visible seams between the planks. Let there be a thin straight rod not so long as the breadth of the planks. This rod, being tossed up at hazard, will either fall quite clear of the seams or will lie across one seam. Prove that in the long run the fraction of the whole number of trials in which a seam is intersected, will be the fraction which twice the length of the rod is to the circumference of the circle having the breadth of the plank for its diameter."

SOLUTION BY WILLIAM HOOVER, BELLEFONTAINE, OHIO.

Let $2a$ = width of planks, $2b$ = length of rod, φ = the angle the rod makes with a perpendicular to the seams, and let x = the distance of the center of the rod from the nearest seam. The rod will cross a seam for all values of x from 0 to $b \cos \varphi$; hence the chance of crossing the seam is $4\varphi \div 2\pi$, and as the chance that the center of the rod will take the particular position at the distance x from the seam is $dx \div a$, the required probability will

$$\text{evidently be} \quad \frac{2}{\pi a} \int \varphi dx = \frac{2b}{\pi a} \int_0^{\frac{1}{2}\pi} \varphi \sin \varphi d\varphi = \frac{2b}{\pi a}.$$

NOTE, BY CHRISTINE LADD, UNION SPRINGS, N. Y. — THE relation between the sides and diagonals of the contra parallelogram given in problem 118 is a particular case of the relation between the two values of the side of a triangle when the remaining sides and the angle opposite one of them are given. If c be the side required and B the angle given, we have

$$c = a \cos B \pm b \cos a,$$

$$cc' = a^2 \cos^2 B - b^2 \cos^2 a = a^2 - b^2.$$

SOLUTION OF PROBLEMS IN NO. SIX, VOL. III.

SOLUTIONS of problems in No. 6, Vol. III, have been received as follows:

From Marcus Baker, 137; Henry Gunder, 137 and 139; H. Heaton, 139, 140 and answer to query; Artemas Martin, 139 and 140; W. L. Marcy, 137 and 140; Prof. J. Scheffer, 138; E. B. Seitz, 137 and 140; Prof. D. Trowbridge, 140; R. J. Adcock, answer to query.

137. "A point D , is given in position between two lines which make a given angle at A . Find the position of a given line, BC , drawn through D , and intersecting the two lines in the points B and C ."